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EXAMINER
LAROSE, COLIN M

ART UNIT	PAPER NUMBER
2623	

DATE MAILED: 05/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/036,979	MUKHERJEE ET AL.
	Examiner	Art Unit
	Colin M. LaRose	2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>06 December 2004</u>.

2a)☒ This action is **FINAL.**   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *14-19* is/are allowed.

6)☒ Claim(s) *1-3,5,6,8-10 and 13* is/are rejected.

7)☒ Claim(s) *4,7,11 and 12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Arguments and Amendments

1.   Applicant's amendments and arguments filed 6 December 2004, have been entered and

made of record.

Response to Amendments and Arguments

2.   Applicant has amended claim 1 to denote that at least one of the plurality of stripes

"spans opposing edges of the image." Applicant then argues (see Remarks filed 6 December

2004) that both Bottou and the combination of Bottou and de Queiroz '981 do not disclose or

suggest such a feature. Applicant points to the fact that Bottou and de Queiroz '981 employ

"blocks" as evidence that the two do not teach "a plurality of stripes spanning the image."

(Figure 4 of Bottou and figure 2 of de Queiroz '981 illustrate the use of blocks.)

Applicants arguments have been considered, however, Examiner considers specifying

that the stripes "spans opposing edges of the image" to be an obvious limitation in view of the

teachings of Bottou and de Queiroz '981.

Both systems of Bottou and de Queiroz '981 operate in the Mixed Raster Content (MRC)

environment, as does the present invention. According to the MRC technique, a document image

is divided into different layers in order to facilitate compression, processing, or the like.

Both Bottou and de Queiroz '981 divide an image into blocks in order to effect MRC-

type processing. See figure 4 of Bottou and figure 2 of de Queiroz '981. Both Bottou and de

Queiroz '981 process their images on the basis of blocks. However, it is also apparent that both

disclosures provide for processing entire *stripes* of blocks, in accordance with MRC protocol.

Specifically, de Queiroz '981 teaches that processing stripes comprised of blocks is a convention

of the MRC format. Referring to column 1, lines 55-67, de Queiroz teaches that segmentation

according to the MRC format "is performed by sectioning the image into stripes (where the

height of each stripe is equal to the size of the block) and processing each stripe block by block

from the top of the image to the bottom." For example, in figure 2 of de Queiroz '981, a first row

of blocks that span the width of the image constitutes a first stripe, a second row of blocks

constitutes a second stripe, and so on. This teaching coincides with Applicant's segmentation of

the image into stripes and processing on the basis of the stripes, as depicted in figure 2 of the

instant application and as claimed in claim 1.

Since both disclosures of Bottou and de Queiroz '981 are in the MRC environment and

de Queiroz '981 teaches that conventionally, MRC processing is effected on the basis of stripes

(composed of blocks) that span the width of an image, this limitation is considered to be an

obvious modification.

Applicant relies on the fact that de Queiroz '981 teaches processing is performed block-

by-block as a basis for supporting the contention that de Queiroz '981 does not process entire

stripes (see Applicant's Remarks, p. 12). This argument is unpersuasive, as claim 1 merely calls

for processing on the basis of stripes and does not preclude a construction wherein stripes are

broken into blocks, and entire stripes are processed on the basis of their corresponding blocks.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
such that the subject matter as a whole would have been obvious at the time the invention was made to a person
having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
manner in which the invention was made.

4.   Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent

5,900,953 by Bottou et al. ("Bottou") in view of de Queiroz '981.

[de Queiroz '981 incorporates by reference U.S. Patent 6,334,001 by de Queiroz et al.

("de Queiroz '001"). See column 3, lines 45-50 and column 4, lines 7-8.]

Regarding claim 1, Bottou discloses a method of decomposing an image comprising:

decomposing the image into a plurality of blocks (column 4, lines 3-6: image is divided

blocks, which provide coverage of the entire image);

determining a layer base color, a layer size, and a layer offset of at least one block of the

plurality of blocks (figure 2 and column 3, lines 25-34: A pixel of interest is determined to reside

in either the foreground layer or the background layer based on the difference (offset) between

the current color of each of the layers and the color of the pixel of interest. This difference

corresponds to the "layer offset". The foreground and background layer base colors are

determined as an average of all the pixels in each layer. And after all pixels in all the blocks are

assigned to either the foreground layer of background layer, then the size of each layer is

known); and

separating said at least one block into a foreground layer and a background layer based

on the layer base color and the layer offset (column 3, lines 25-34: as explained above, the pixels

of each block in the image are separated into the foreground and background layers based on

both the color of the layers ("layer base colors") and the offset between the pixel of interest and

the layer base colors ("layer offset")).

Bottou is silent to creating a mask layer and interpolating irrelevant values, as claimed.

de Queiroz '981 discloses a system for segmenting images into foreground and

background planes in the Mixed Raster Content environment, similar to that of Bottou. In

particular, de Quieroz discloses segmenting a document into 3 layers – background, foreground,

and selector (column 5, lines 32-49).

It would have been obvious to one of ordinary skill in the art at the time of the invention

to modify Bottou by de Queiroz '981 to further separate the image into a mask layer, as claimed,

since de Queiroz '981 discloses that, for the MRC format, images are conventionally segmented

into foreground and background layers, and a mask layer is also created in order to indicate to

which layer each pixel belongs (see column 1, lines 25-32).

de Queiroz '001 discloses that a way to enhance compression of MRC-decomposed

documents is to interpolate irrelevant pixels in the background and foreground layers (de

Queiroz '001, column 9, lines 41-55: irrelevant pixels (N's) are interpolated (i.e. replaced)).

It would have been obvious to one of ordinary skill in the art at the time of the invention

to further modify Bottou by de Queiroz '981 to interpolate, as claimed, since de Queiroz '001

discloses that interpolating irrelevant pixel values in the foreground and background layers

enhances compression (i.e. interpolating increases coder efficiency).

Bottou is also silent to processing the image on the basis of stripes that span opposing

edges of the image. Rather, Bottou teaches processing the image block-by-block.

de Queiroz '981 teaches that processing stripes comprised of blocks is a convention of

the MRC format. Referring to column 1, lines 55-67, de Queiroz teaches that segmentation

according to the MRC format "is performed by sectioning the image into stripes (where the

height of each stripe is equal to the size of the block) and processing each stripe block by block

from the top of the image to the bottom." For example, in figure 2 of de Queiroz '981, a first row

of blocks that span the width of the image constitutes a first stripe, a second row of blocks

constitutes a second stripe, and so on. This teaching coincides with Applicant's segmentation of

the image into stripes and processing thereof, as depicted in figure 2 of the instant application

and as claimed in claim 1.

Since both disclosures of Bottou and de Queiroz '981 are in the MRC environment and

de Queiroz '981 teaches that conventionally, MRC processing is effected on the basis of stripes

(composed of blocks) that span the width of an image, this limitation is considered to be a

modification that would have been obvious to those skilled in the art at the time of the invention.

Regarding claim 2, Bottou discloses encoding each of the layers (column 1, lines 36-38).

Regarding claim 3, de Queiroz '981 discloses the foreground and background are JPEG

encoded, wherein the mask is JBIG encoded (column 5, line 57 through column 6, line 3).

5.   Claims 5, 6, 8-10, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Bottou in view of de Queiroz '981, and further in view of "On Data Filling algorithms for MRC

Layers" by de Queiroz ("Data Filling").

Regarding claim 5, de Queiroz '001 discloses the interpolating further comprises:

classifying each pixel within a selected block of a selected layer as relevant or irrelevant

(figure 4: Y = relevant pixels, N = irrelevant pixels);

generating a coefficient block representing a forward transform of the selected block

(804, figure 9);

modifying coefficient values to generate a modified coefficient block (804: quantize

coefficients and 806: remove some coefficients) subject to a set of predetermined constraints

(812: the condition(s) to stop modifying the coefficients).

de Queiroz '001 discloses that the pre-determined constraints include comparing the

relevant pixels in consecutive blocks and discontinuing the iterations if "a designated criteria is

met" or "a designated amount of improvement or change has occurred" (column 10, lines 34-44).

Thus, de Queiroz '001 does not expressly disclose the constraint is that the "relevant

pixels have a same value in an inverse transformation of the modified block as in the selected

block.

"Data Filling" is a paper by de Queiroz that discloses the same iterative modification of

DCT coefficients for each block. In particular, "Data Filling" discloses that the constraint for

modifying the DCT coefficients is "convergence", wherein convergence is achieved when

successive relevant pixels are identical (see Section 4.2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify de Queiroz '001 so that the constraint for modifying the coefficients is that the relevant pixel have a same value as claimed, since "Data Filling" teaches that using the claimed stopping criteria achieves superior results.

Regarding claim 6, de Queiroz '001 discloses the modifying includes:

selecting a coefficient from the coefficient block in a reverse zig-zag order wherein the selected coefficient has a non-zero value (806, figure 9: high frequency coefficients are selected (and removed), according to the zig-zag order shown in figure 10); and

finding a feasible solution resulting in a zero quantizable selected coefficient subject to the predetermined constraints (812, figure 9: a feasible solution is reached when the stopping criteria is met (i.e. convergence is achieved, per "Data Filling"); and the solution contains coefficients quantized to zero (i.e. removed)).

Regarding claim 8, de Queiroz '001 discloses values of individual elements of a mask classify pixels in corresponding positions within the selected block as relevant or irrelevant (figure 3: pixels values in mask (selector plane) determine the relevance of pixels in the upper and lower planes, as shown in figure 4).

Regarding claim 9, de Queiroz '001 discloses:

providing the modified coefficient block to a block compression process (figure 9: modified coefficient block from 804 is sent to a block compression stage (806) to remove high frequency coefficients).

Regarding claim 10, de Queiroz '001 discloses the interpolating further comprises applying a linear program to identify a feasible solution resulting in a zero-quantizable

coefficient subject to the constraints (812, figure 9: a linear inequality function ("program") is applied to determine if the current pixels are sufficiently close to the original pixels).

Regarding claim 13, de Queiroz '001 discloses that the forward transform is discrete cosine (804, figure 9).

Allowable Subject Matter

6.   Claims 4, 7, 11, and 12, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 14-19 are allowed. Neither Bottou nor de Queiroz '981 discloses or suggests the step of identifying the claimed area of intersection by computing a maximum block range, as claimed, and by assigning at least one pixel within the selected block to one of the foreground and background planes, as claimed.

Conclusion

7.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing

date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Colin M. LaRose whose telephone number is (571) 272-7423. If

attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia

Au, can be reached on (571) 272-7414. The fax phone number for the organization where this

application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should

be directed to the TC 2600 Customer Service Office whose telephone number is (571) 272-2600.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CML
Group Art Unit 2623
22 April 2005

VIKKRAM BALI
PRIMARY EXAMINER